
A Reconsideration of *Chaunanthus* (Brassicaceae)

Robert A. Price

Department of Botany, University of Georgia, Athens, Georgia 30602, U.S.A.

Ihsan A. Al-Shehbaz

Missouri Botanical Garden, P.O. Box 299, St. Louis, Missouri 63166-0299, U.S.A.

ABSTRACT. Three Mexican endemic species of shrubby habit and apparent thelypodiod affinities (*Iodanthus acuminatus*, *I. mexicanus*, and *I. petiolatus*) are separated from the eastern North American herb *Iodanthus pinnatifidus* as the genus *Chaunanthus* O. E. Schulz. The new combinations *Chaunanthus acuminatus* and *C. mexicanus* are proposed. The distinguishing features and geographic distribution of the genus *Chaunanthus* are discussed, and a key to species and synopsis of its three included species are presented.

Key words: Brassicaceae, *Chaunanthus*, *Iodanthus*, Mexico.

Beginning with the revision of Rollins (1942), *Iodanthus* Torrey & A. Gray included four species, three endemic to Mexico (*I. acuminatus* Rollins, *I. mexicanus* Rollins, and *I. petiolatus* (Hemsley) Rollins) and one, the type species *I. pinnatifidus* (Michaux) Steudel, widely distributed in riverine and moist wooded habitats in the eastern half of the United States (Al-Shehbaz, 1988; Rollins, 1993). Alternatively, the one Mexican species published prior to Rollins (1942) was originally treated as a thelypodiod mustard (*Thelypodium petiolatum* Hemsley), and later transferred to the monotypic genus *Chaunanthus* by Schulz (1924). Prantl (1891) allied the monotypic *Iodanthus* with *Cardamine* L. and relatives, whereas Schulz (1936) placed it in a heterogeneous tribe Matthioleae. Molecular sequence comparisons for the chloroplast gene *ndhF* (Price & Sweeney, 1998) strongly indicate that the eastern North American *I. pinnatifidus* is in fact closely related to *Cardamine* L., with which it shares an herbaceous habit, glabrous to sparsely pubescent leaves, white to purplish flowers, and a tendency to grow in mesic habitats. In contrast, the three Mexican species are suffrutescent in habit, have markedly pubescent leaves and yellow to creamy white flowers, and often occur in drier montane habitats. They clearly group in all molecular comparisons to date (Price, unpublished) with *Thelypodium* and relatives in a clade quite

distant from *Cardamine* and *I. pinnatifidus*. On the basis of morphological evidence and molecular data, we have reassessed the Mexican species previously placed in *Iodanthus* and treat them below as the separate genus *Chaunanthus*.

Chaunanthus differs from *Iodanthus* by having basally woody stems, wingless petioles, non-auriculate cauline leaves, pubescent leaves and stems, petals undifferentiated into claw and blade, sepals half as long as to subequaling petals, obtuse non-apiculate anthers, well-developed median nectar glands confluent with the lateral nectaries, often secund fruits, and incumbent cotyledons. By contrast, *Iodanthus* has herbaceous stems, winged petioles, auriculate cauline leaves, glabrous leaves and stems, petals strongly differentiated into a blade and claw and more than twice as long as the sepals, strongly apiculate anthers, median nectaries totally lacking, spreading, non-secund fruits, and incumbent cotyledons. In our opinion, these morphological differences are quite significant, and they clearly support the removal of the Mexican species of *Iodanthus* sensu Rollins (1942, 1993) to *Chaunanthus*. *Chaunanthus* is distinguished from *Thelypodium*, in which *C. petiolatus* was originally placed, by its suffrutescent habit, long petiolate, undivided, dentate, non-auriculate cauline leaves, yellow to creamy-white petals, included stamens, and non-torulose sessile fruits. In contrast, *Thelypodium* is characterized by a biennial herbaceous habit, sessile auriculate or petiolate and pinnately divided (rarely only toothed) cauline leaves, purple, lavender, or white flowers, exserted stamens, and torulose fruits that are often short-stipitate.

Rollins (1942) examined only nine specimens of the three Mexican species that he placed in *Iodanthus*. Although only the type collection of *Chaunanthus mexicanus* is currently known, many collections of *C. petiolatus* and *C. acuminatus* have been made since Rollins's account, so we present below an updated summary of the ecology, distribution, and phenology of the latter two species based upon a much expanded set of collections.

KEY TO THE SPECIES OF *CHAUNANTHUS*

- 1a. Fruit strongly flattened, long hirsute, attenuate to beak-like apex; stigma sessile; stem apex ending in a leafy, paniculate inflorescence 3. *C. mexicanus*
- 1b. Fruit terete, glabrous or minutely puberulent, cuneate to apex; stigma on a distinct style; stem apex ending in leafless racemes.
 - 2a. Stems hirsute; leaf trichomes exclusively simple; petals 2–3 mm wide . . . 1. *C. petiolatus*
 - 2b. Stems glabrous or puberulent; leaf trichomes stalked-forked at least on abaxial surface; petals ca. 1 mm wide 2. *C. acuminatus*

1. *Chaunanthus petiolatus* (Hemsley) O. E. Schulz, in Engler, *Pflanzenreich* IV. 105 (Heft 86): 159. 1924. Basionym: *Thelypodium petiolatum* Hemsley, *Diagn. Pl. Nov. Mex.* 2. 1878. *Iodanthus petiolatus* (Hemsley) Rollins, *Contr. Dudley Herb.* 3: 211. 1942. TYPE: Mexico. Hidalgo: Zimapan, *J. M. Coulter* 684 (holotype, K; isotype, GH).

Phenology. Flowering July through early October, fruiting September through October.

Habitat. Steep rocky volcanic outcrops, open scrub-oak forests with andesite and basalt boulders; elevation 2000–2850 m.

Specimens examined. MEXICO. **Distrito Federal:** Vertiente E del Cerro de Santa Catarina, cerca de Sta. Catarina, delg. Tláhuac, *Rzedowski* 26063 (CAS, MEXU, MICH); Deleg. Tláhuac, 3 km NO de San Francisco Tlaltingo, Ladera SSE del cerro de Sta. Catarina, *García* 1675 (MEXU); Lomas de Mixcoac, *Lyonnet* 1386 (CAS, MEXU). **Guanajuato:** 2 km al NW de La Gavia, sobre el camino a Cortazar, *Rzedowski* 40948 (IEB); 14 km de San Luis de la Paz, vers Victoria, pr, vers Victoria, près de la Presnsita, 21°18'N, 100°26'W, *Caranza Gonzales & Labat* 2530 (IEB). **Hidalgo:** Cerro Grande, al SE de Epazoyucan, *Rzedowski* 29322 (MEXU); Cerro Alto, 2 km al S de Epazoyucan, *Rzedowski* 31127 (ARIZ, MEXU, MICH); Cerro Xihuingo, cerca de Los Cides, Mun. Tepeapulco, *Rzedowski* 31504 (MEXU); 2 km al N de Huixmi, Mun. Tlaxiaca, *Rzedowski* 36956 (IEB, MEXU); Metztitlán, head of descent into Barranca de Metztitlán between Zoquitlan and Los Venados, *Moore & Wood* 4217 (GH, UC); Zimapan, Cerrote, 10 km sur del entronque de la carr. de Zimapan, *Hernández & Rodríguez* 5020 (CAS, MEXU, MO); Pachuca, *Purpus* 6512 (F, GH, MO, UC); Cerro Tecajete, Mun. de Zempoala, *Ventura* 332 (CAS, MEXU, MICH); Cerro Xihuingo, Mun. de Tepeapulco, *Ventura* 473 (MEXU, MICH), *Ventura* 2161 (MEXU); Mun. San Agustín Tlaxiaca, Sierra del monte alto de Temoaya, 5 km después de la desviación de la carretera Benito Juárez–Chapulte, 20°05'N, 99°01'45"W, *Díaz* 834 (MEXU); Mun. Ajacuba, cerro al NE del poblado Emiliano Zapata, vertiente S de la Sierra de Chicavasco, ejido San Nicolás Tecomatlán, 20°08'50"N, 99°00'45"W, *Díaz* 672 (MEXU); Cerro de Santa Monica, N of Santa Monica, 40 km NW of APAM, on Pachuca highway, *West P-26* (MICH). **México:** San Andrés, 5 km al SW de San Cristóbal Ecatepec, *Rzedowski* 27633 (MEXU, MICH, TEX); 6 km al W de San Cristóbal Ecatepec, parte alta de la Sierra de Gua-

dalupe, *Rzedowski* 32182 (MEXU); Ecatepec, Sierra de Guadalupe, 3 km N Ecatepec, Division Tecuexcomac, entrando por Col. Ampliación, *García* 1477 (ARIZ, MEXU, MO, TEX); entre Cuatepec y San Cristobal Ecatepec, Sierra de Guadalupe, *Matuda* 25702 (GH, IEB, MEXU, TEX); Sierra de Guadalupe, al N de la Ciudad de México, *Paray* 1165 (MEXU); Mt. Guadalupe, near Mexico, *Bourgeau* 762 (E, GH). **Puebla:** Boca de Monte, *Purpus* 3692 (UC, US). **Queretaro:** parte alta del Cerro La Tembladera, 10.5 km al N de Peña Blanca, Mun. Peñamiller, *Pérez & Zamudio* 3238 (IEB).

2. *Chaunanthus acuminatus* (Rollins) R. A. Price & Al-Shehbaz, comb. nov. Basionym: *Iodanthus acuminatus* Rollins, *Contr. Dudley Herb.* 3: 212. 1942. TYPE: Mexico. Jalisco: Sierra Madre Occidental, San Sebastian, Arroyo Seco, thicket near stream, 15 Jan. 1927, *Ynes Mexia* 1491 (holotype, UC).

Phenology. Flowering November through June, fruiting January through October.

Habitat. Clay soil in steep volcanic slopes and flats in forests, deep shade in forest understory; elevation 1200–2600 m.

Specimens examined. MEXICO. **Colima:** Rancho el Jabalí, 20 km N de la Cd. de Colima, cerca de la Hacienda San Antonio, 19°26'N, 103°40'W, *R. & E. Martínez* 960 (K); Mun. de Comala, Rancho El Jabalí, 22 km NNW of Colima in SW foothills of Volcan de Colima, 19°26.9'N, 103°42.7'W, *Sanders, Charlton, Phillips & Rothschild* 10656 (GH, MICH), *Vazquez* 524 (GH, MEXU), *Vazquez & Phillips* 891 (MEXU), *Vazques* 971 (MO); Rancho El Jabalí, 25 km NNW of Colima, Lago, Epazote, 19°26.6'N, 103°40.7'W, *Sanders, Daniel & Phillips* 11017 (MICH); Rancho El Jabalí, 22 Km NNW Colima, Lago Jabalí, 19°26.9'N, 103°41.8'W, *Sanders, Daniel & Phillips* 11108 (GH, MICH). **Jalisco:** 5 mi. NNE of Talpa de Allende, E-facing slopes N of road-summit, *McVaugh* 20183 (GH, MEXU, MICH); 10–12 km N La Cuesta, below the pass to Talpa de Allende, *McVaugh* 233371 (MICH); Sierra Madre Occidental, San Sebastian, E of Segundo Arroyo, *Mexia* 1565 (UC); Jocotepec, Cerro Viejo, paraje El Quinto, enfrente de Zapotitan de Hidalgo, *Machuca* 6366 (MICH); Cerro Viejo, vereda a Barranca del Agua, *Machuca* 3533 (MICH).

3. *Chaunanthus mexicanus* (Rollins) R. A. Price & Al-Shehbaz, comb. nov. Basionym: *Iodanthus mexicanus* Rollins, *Contr. Dudley Herb.* 3: 213. 1942. TYPE: Mexico. Puebla: Coxcatlan, Sep. 1909, *C. A. Purpus* 4158 (holotype, GH; isotypes, MO, UC).

Known only from the type collection.

Acknowledgments. We thank the curators and directors of the herbaria cited in this work. We are grateful to Jerzy Rzedowski for his critical review of the manuscript and for sending photocopies of specimens deposited at IEB.

Literature Cited

Al-Shehbaz, I. A. 1988. The genera of Arabideae (Cruciferae; Brassicaceae) in the southeastern United States. *J. Arnold Arbor.* 69: 85–166.

Prantl, K. 1891. Cruciferae. *In* A. Engler & K. Prantl (editors), *Nat. Pflanzenfam.* III. 2: 145–206.

Price, R. A. & P. W. Sweeney. 1998. Relationships in the tribe Cardamineae (Brassicaceae) from *trnL-F* and *ndhF* sequence comparisons. *Amer. J. Bot.* 85(6, Suppl.): 152.

Rollins, R. C. 1942. A systematic study of *Iodanthus*. *Contr. Dudley Herb.* 3: 209–215.

———. 1993. The Cruciferae of Continental North America. Stanford Univ. Press, Stanford.

Schulz, O. E. 1924. Cruciferae–Sisymbrieae. *In* A. Engler (editor), *Pflanzenreich* IV. 105 (Heft 86): 1–388.

———. 1936. Cruciferae. *In* A. Engler & K. Prantl (editors), *Nat. Pflanzenfam.*, ed. 2., 17B: 227–658. Verlag von Wilhelm Engelmann, Leipzig.